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INDIVIDUALIZING THE INSTRUCTIONAL PROGRAM.

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AS STRESSED AND ILLUSTRATED THROUGHOUT THE DISCUSSION, AN INDIVIDUALIZED LEARNING PROGRAM OR ASSIGNMENT MUST INCLUDE OBJECTIVES WHICH ARE EXPRESSED IN TERMS OF SPECIFICALLY OBSERVABLE BEHAVIOR. THESE OBJECTIVES FALL WITHIN FOUR CATEGORIES OF INTELLECTUAL TASKS--KNOWLEDGE, COMPREHENSION, APPLICATION, AND INVENTION. TO ASSESS A STUDENT'S ACHIEVEMENT OF A PARTICULAR OBJECTIVE OR TASK, THE CLASSROOM TEACHER MIGHT USE A "CURRICULUM MAP," AN EXAMPLE OF WHICH IS INSERTED IN THIS REPORT. INDIVIDUALIZING INSTRUCTION MODIFIES THE ROLE OF THE TEACHER, AND INSTEAD OF CONFRONTING A GROUP OF STUDENTS WITH A COLLECTION OF FACTS, HE ENGAGES EACH STUDENT IN THE ACTUAL PROCESS OF ACQUIRING AND GENERATING KNOWLEDGE. SAMPLE INDIVIDUALIZED ASSIGNMENTS, WITH OBJECTIVES EXPRESSED IN TERMS OF A "CRITERION PERFORMANCE," ARE APPENDED. (LB)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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INDIVIDUALIZING

The Instructional Program

UD 005 132

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INDIVIDUALIZING THE INSTRUCTIONAL PROGRAM

Individualized instruction for all students has long been a goal of American education. By individualized instruction is meant an arrangement whereby every student is encouraged to pursue learning according to his own personal inventory of abilities, needs, and interests.

The purpose of this presentation is to suggest how, given a proper arrangement of teacher strengths, instructional materials, and administrative support, a completely individualized program of instruction can be achieved - not on some dim tomorrow, but now, today, with the means we currently have at our disposal.

First of all, we offer the observation that voluntary teacher participation in a paid in-service project is an effective way to begin preparing for an individualized instructional program.

We say voluntary teacher participation because without it the odds are high against the success of any in-service project.

In-service work for an individualized program of instruction might well start with the writing of instructional objectives expressed in terms of observable student behavior.

This is a matter of great importance. For unless we can specify under what conditions and to what extent a certain type of student performance can be expected to take place, we shall not be able to develop the kind of prescriptive learning assignments that are essential to an effective program of individualized instruction.

It is strongly recommended that persons proposing to write objectives in terms of observable student behavior undertake a careful reading of Robert Mager's book, Preparing Instructional Objectives.

The objectives for each subject matter field should probably be written by those project teachers who, in each instance, are most knowledgeable about the instructional area under consideration.

For many years, educators have talked about the importance of instructional objectives. The purpose of an instructional objective is to make clear to teachers, students, and other interested persons

what it is that needs to be taught - or what it is that has been taught.

A well-written instructional objective should say three things: It should say what it is that a student who has mastered the objective will be able to do. It should say under what conditions the student will be able to do this. It should say to what extent the student will be able to do this. To put the matter in a single sentence, a well-written instructional objective should specify under what conditions and to what extent a certain kind of student performance can be expected to take place.

Performance - conditions - extent. Let us consider, first, the word performance. Performing means doing. A student who performs something does something.

Here are two statements. Which one is expressed in terms of student performance?

A. The student will have a good understanding of the letters of the alphabet, A through Z.

B. The student will be able to pronounce the names of the letters of the alphabet, A through Z.

Statement B tells what it is that the student will be able to do. He will be able to pronounce the names of the letters of the alphabet, A through Z.

Statement A tells us that the student will have a good understanding of the letters of the alphabet. But this is not very clear. We cannot tell what it is that the student is supposed to be able to do as a result of this understanding.

Let's try another pair of statements. Which one is expressed in terms of student performance?

A. The student will have an adequate comprehension of the mechanics of punctuation.

B. Given a sentence containing an error in punctuation, the student will correct the mistake.

Statement B tells what it is that the student will do. He will correct the error in punctuation.

Statement A, which says that the student will have an adequate comprehension of the mechanics of punctuation, is rather cloudy. We cannot tell what it is that the student is supposed to be able to do as a result of his comprehension.

At this point, an objection may be raised. Isn't the person who is comprehending something doing something? Isn't intellectual performance an acceptable kind of student performance?

Certainly. The difficulty is that mental activity, as such, is not directly observable. We cannot

literally open up a person's head and see the thinking that is going on inside. If it is to be of use to us, a statement of performance must specify some sort of behavior that can be observed.

This does not mean that we are not concerned about intellectual performance. It does mean that since mental activity, as such, is not directly observable, some sort of behavior that is observable will have to stand for or represent the intellectual performance we have in mind.

For example, suppose that we are interested in having students know something about the writing style of Ernest Hemingway. Whatever may be intellectually involved in the attainment of this goal, it should be apparent that the language of our aim as stated leaves much to be desired.

What is the student who knows able to do that the student who does not know is not able to do? This is the important question because, until we have worked out a clear answer to it, we cannot measure the accomplishment of our instructional purpose. Although there is no single answer to the question we have posed (our objective of "knowing something" is too vague for that), here is a possible statement of desired performance:

Given ten pairs of short prose passages - each pair having one selection by Ernest Hemingway and one by a different author - the student is able, with at least 90% accuracy, to choose the ten selections written by Hemingway.

Performance - conditions - extent. We have been talking about performance. Let us now consider conditions.

Here is one of our earlier statements concerning the alphabet: The student will be able to pronounce the names of the letters of the alphabet, A through Z. We have said that this statement is expressed in terms of student performance. Does this statement also set forth the conditions under which the performance is to take place?

No, it does not. For one thing, we cannot tell from our statement whether the student is to pronounce the names of the letters at sight or from memory. If the letters are to be shown, we do not know whether the student is to work with capital letters, small letters, or both. Nor do we know whether the student is to work with these letters in regular sequence or in random order. Obviously, each set of conditions

is substantially different from the rest, and will make its own special demands upon the student who attempts to accomplish the objective.

Let's examine two more statements. Which one sets forth the conditions under which a certain kind of performance is to take place?

A. Given the Dolch list of the ninety-five most common nouns, the student will be able to pronounce correctly all the words on this list.

B. The student will be able to pronounce correctly at least 90% of all words found in most beginning reading books.

Statement A, which tells us that the Dolch list of the ninety-five most common nouns will be used, sets the conditions for the demonstration of student mastery. We are told that these particular words, and no others, are the ones at issue for this objective.

Statement B, offering us only the dubious clue of "words found in most beginning reading books," does not tell us enough. Our conditions need to be defined more precisely than this.

We have come now to the matter of the extent and level of performance. A well-written instructional objective will establish an acceptable minimum standard

of achievement.

Look at this objective: Given twenty sentences containing both common and proper nouns, the student will be able to identify with very few mistakes both kinds of nouns. Does this objective establish a minimum standard of achievement?

No, it does not. To say that the student is to perform "with very few mistakes" leaves open the question: how many mistakes are only a very few?

Here is the Hemingway objective we looked at earlier: Given ten pairs of short prose passages - each pair having one selection by Ernest Hemingway and one by a different author - the student is able, with at least 90% accuracy, to choose the ten selections written by Hemingway. Does this objective establish a minimum standard of achievement?

Yes, it does. The student is expected to be able, "with at least 90% accuracy, to choose the ten selections written by Hemingway." This constitutes a minimum standard of achievement.

Let's try one more objective: The student should be able to pronounce from memory, and in sequence, the names of the letters of the alphabet, A through Z.

Does this objective establish a minimum standard of achievement?

Yes, it does. The objective implies that we are looking for 100% mastery. However, we could, if we wanted to be explicit, re-state our objective in this way: The student should be able to pronounce from memory, in sequence, and with 100% accuracy, the names of the letters of the alphabet, A through Z.

An instructional objective should not ordinarily be limited to specific means (particular materials or methods), but should be stated in terms that permit the use of various procedures. Look at this statement of an objective: Given the California Test Bureau's E-F level programmed booklet on capitalization, the student is able to work through the exercises in this booklet with at least 90% accuracy. Is this objective limited to the use of a particular instructional item or procedure?

Yes, it is. The objective is expressed exclusively in terms of performance with a specific booklet. Although the particular kind of skill development that is promoted by this booklet is presumably also fostered by other instructional materials and methods, no such options are available under the terms of our objective as it is now written.

Look at this statement of an objective: Given twenty sentences containing a variety of mistakes in capitalization, the student is able, with at least 90% accuracy, to identify and re-write correctly each word that has a mistake in capitalization. Is this objective limited to the use of a particular instructional item or procedure?

No, it is not. The objective, as now stated, permits us to use a number of instructional items that show promise in being able to help students attain the desired performance. Among these items are not only the California Test Bureau's E-F level material, but the somewhat simpler C-D level presentation, a programmed booklet by D. C. Heath, Unit II of English 2200, Unit 9 of English 2600, Lessons 87 and 88 of English 3200, several filmstrips on capital letters, and so on.

Finally, a well-written instructional objective will suggest how its accomplishment can be measured. This fo!!ows from our view that a well-written objective specifies under what conditions and to what extent a certain kind of student performance can be expected to take place.

Look at this objective: The student should know the alphabet. Does this objective suggest how its accomplishment can be measured?

No, it does not. The reason for this is that knowing the alphabet can mean different things to different people. Therefore, depending upon what is meant, the measuring of this knowing will take different forms.

Suppose we elaborate upon our objective so that it reads: Shown the letters of the alphabet in random order (in both upper and lower case form), the student is able to say the name of each letter with 100% accuracy. Does our objective now suggest how its accomplishment can be measured?

Yes, it does. It tells us that the student will be shown the letters of the alphabet, that he will be shown these letters in both upper and lower case form and in random order, and that he will be called upon to say with 100% accuracy the name of each letter shown. The objective, in other words, makes it plain how its accomplishment can be measured.

If teachers at all levels of schooling would be this explicit in writing instructional objectives, they might reasonably hope to eliminate almost immediately one cause of learning failure among students: the traditional fuzziness of classroom assignments.

Once written, instructional objectives may be organized in various ways. For example, the objectives

for one of our individualized elementary school programs have been assembled in booklets that are color coded according to varying levels of difficulty.

For that program, we happen to have seven different booklets of objectives for each subject matter area - each booklet approximating a particular grade level in difficulty.

We have also found it useful to arrange our objectives in the form of curriculum maps, one map for each booklet of objectives.

Our curriculum maps do three things:

First, they suggest instructional sequences.

Second, they show dependency relationships as these may exist among instructional objectives.

Third, they attempt to classify cognitive tasks according to the categories of knowledge, comprehension, application, and invention.

In developing this third feature, we have been strongly influenced by Bloom's Taxonomy of Educational Objectives: Cognitive Domain.

The Bloom taxonomy uses six categories: knowledge, comprehension, application, analysis, synthesis, and evaluation.

Although we have found Bloom's suggested hierarchy stimulating to explore, and most helpful in making us keenly aware of a broad range of intellectual activities, we have gradually come around to working with a simpler taxonomy of our own construction.

Our classification scheme, as we have indicated, employs four categories. These are knowledge, comprehension, application, and invention.

As is true of the Bloom taxonomy, our categories for classifying intellectual tasks are not as clear and distinct as one might wish. This is partly because cognitive accomplishments often include activities that are, in turn, appropriate to different categories.

Perhaps the best way to resolve this difficulty is to focus upon the main thrust of an instructional objective and classify it accordingly.

It should also be remembered that an intellectual task is frequently defined by the nature of the test items or situation used to measure its achievement. For example, if items identical to those the student has practiced on are used in the test situation, the subsequent feat of learning is probably one of simple recall or recongition in spite of itself.

Let us now consider briefly each of our four categories: knowledge, comprehension, application, and invention.

The emphasis in our knowledge category is on simple recall and recognition - in other words, on memory. The student remembers specific items: names, statements, objects, procedures, etc.

For example, the student who learns to arrange the letters of the alphabet in order from A to Z has acquired knowledge. That is to say, the order of the letters is arbitrary and, therefore, must be memorized.

Similarly, the student who is able to list a minimum of ten characteristics for each of the nine planets has acquired knowledge. The learning task involved is presumably largely one of memorization.

Perception rather than memory is the hallmark of our comprehension category. Here the student identifies and continues patterns (not by remembering them, but by observation).

He matches or completes equivalencies and non-equivalencies, and he perceives other relationships in material presented to him.

If, for example, when given two objects, the student is able to indicate a length comparison (longer

than, shorter than, same length as), he has demonstrated comprehension.

Or, given a list of ten latitudes numbered in degrees, if the student is able to categorize them correctly under the headings, Region of High Temperatures, Region of Middle Temperatures, and Region of Low Temperatures, he has demonstrated comprehension.

For our application category, the student selects and then uses one or more principles to produce or alter something. For example, if a student decides upon and then uses a certain formula to solve a problem, he has shown that he can apply what he has learned.

He works upon material according to definite rules which he perceives as being appropriate. Nevertheless, he does not go beyond these rules and principles. Initially, and as a learning task, application is a deliberate and highly conscious act, although in time it may become merely a routine operation scarcely above the threshold of awareness.

A student qualifies for our invention category when he produces, uses, or alters something in a form or manner that in some way goes beyond any existing structures or principles of which he is

aware. For example, after having studied the physical structure of insects, if the student is able to construct a taxonomy of his own which would consist of categories into which all of the insects studied could be sorted according to their structures, he would have invented something.

On the next page is a curriculum map developed for our Franklin-Nettleton Elementary School Individualized Instructional Program. Notice the three features we have been talking about. The numbered circles represent instructional objectives, and their placement from left to right suggests a desirable instructional sequence. The lines connecting some of the circles show dependence relationships as these may exist among instructional objectives. The placement of the circles from top to bottom indicates that these objectives have been classified according to the categories of knowledge, comprehension, application, and invention.

There is at least one map for each student in every subject matter field, and each map is used for making and keeping tract of individual lesson assignments. The maps are housed in ordinary three-ring binders and are arranged in alphabetical order according to

the last names of the students.

When a student masters any given objective, he is promptly assigned another, depending upon what is known about his abilities, needs, and interests, and upon what the curriculum map reveals about the relationships among its objectives.

This brings us to the following question concerning objectives: How large should an assigned objective be?

In attempting to answer this question, it may help to think of the problem as being essentially one of classroom management.

That is to say, if an instructional objective is to function effectively in the classroom, the objective must be small enough so that the student working on it will be able to feel a solid sense of accomplishment within the framework of his personal attention span.

On the other hand, objectives must not be so small that the classroom teacher has no time to do anything but check out students on their completed objectives.

Here the use of additional resources such as teacher aides and self-testing devices can favorably affect the smoothness of the operation and significantly expand the teacher's range of options.

As a rule of thumb, it may be that learning tasks

requiring between fifteen and thirty minutes for their completion will prove to be generally useful. However, this notion has yet to be tried extensively under actual classroom conditions.

We have said that individualized instruction means an arrangement whereby every student is encouraged to pursue learning according to his own personal inventory of abilities, needs, and interests.

To put the matter another way, individualized instruction does not mean a pattern of learning where students are shut away in a series of study cubicles, there to pursue knowledge in splendid isolation from their classmates.

Individualized instruction does not mean a plan for allowing students to wander aimlessly about, free to learn as they please whatever they please. To use a term of the marketplace, individualized instruction is not a design for offering intellectual goods on the basis of simple "impulse buying."

Individualized instruction does not mean team teaching as envisaged by the Trump Plan or similar proposals. It does not involve scheduling large group sessions in order to buy time for small group work.

It is not a track system, nor does it require ability grouping in the commonly understood sense of this term.

In the year 1918, an observer of the then current educational scene had this to say: "You all know how a familiar word, persistently stared at, suddenly becomes almost alarmingly strange and meaningless - how (as William James said) it seems to glare back from the page with no speculation in its eyes.

"You will have something like the same uncanny experience if you watch the operation of a school timetable after rigorously clearning your mind of the familiar associations. From 10:15 to 11:00 twenty-five souls are simultaneously engrossed in the theory of quadratic equations; at the very stroke of the hour their interest in this subject suddenly expires, and they all demand exercise in French phonetics!

"Like the agreement of actors on the stage, 'their unanimity is wonderful' - but also, when one comes to think of it, ludicrously artificial. Can we devise no way of conducting our business that would bring it into better accord with the natural ebb and flow of interest and activity?"

Individualized instruction is, among other things, an attempt to respond to this question of nearly fifty years ago. It is an attempt to achieve in a practical and effective way the American ideal of educating every student according to his own particular needs and abilities.

Our efforts to individualize the instructional program are now in their third year. The emphasis in our project classrooms is on attempting to make it possible for students to learn different things in different ways.

The reason for this is simple: what will be clear and instructive to one student may confuse and frustrate another.

One student may be ready to explore the intracacies of different numerations systems.

One of his fellows may be still trying to master some of the number facts of our familiar base ten.

One student may be ready for the calculator, and another for the slide rule.

Students are permitted to work at their own rate and in their own way.

They can work cooperatively on a given problem...

...or they can work alone.

They are encouraged to budget their own time.

This means that a student who becomes engrossed in a science experiment, for example, has time to pursue his labors.

Or he may take up several tasks within a relatively short span of time.

The point is: each student is encouraged to grow in the ability to organize his own learning.

Students generally operate their own 16mm projectors...

...filmstrip projectors...

...record players...

...and tape recorders.

They locate their own assignment sheets...

...assemble and work with appropriate instructional materials...

...and finally take the test that will measure their accomplishment of an educational objective.

All of this suggests, of course, that under such an arrangement the traditional role of the classroom t teacher has been greatly modified.

The teacher is no longer so much an educational broadcaster as he is an academic trouble-shooter.

He spends less time in front of class lecturing to his students...

...and more time working with students individually...

...or in small groups.

He spends a lot of time preparing his instructional objectives...

...and a lot of time analyzing the specific strengths and weaknesses of individual students in relationship to these objectives.

He tries to acquaint himself with a wide range of instructional items that can be used to help students achieve instructional objectives.

For example, if he is trying to develop among his students certain skills in capitalization, he knows that using a single all-purpose textbook is not an efficient way to proceed.

He has observed many times that what will work very well with one student will just not work at all with another.

He therefore reasons that using a number of different teaching materials will likely prove to be more effective in helping students acquire the skills he has in mind.

One such item is the California Test Bureau's Level E-F programmed booklet on capitalization. This booklet has, among other things, the traditional programmed feature called immediate reinforcement.

That is to say, as the student works through the booklet, he knows at each step how well he is doing. He does not have to wait until a later date to find out whether his responses have been right or wrong.

This booklet uses a kind of programming that is called branching. This means that a student does not have to work through every page of the booklet, but is able to branch from one part to another depending on how well he answers the problems in the booklet.

It is important to remember that one of the advantages of programmed instruction is that the format of the material makes it relatively easy for the student to work along at his own pace. He does not have to depend on the teacher to clear up every difficulty or to tell him what to do next.

To the extent that students are simultaneously engaged in learning different tasks at different levels, keeping tract of student progress becomes a real problem. Student records must be kept in such a way

that the teacher can quickly determine what any student is supposed to be doing, and what his school accomplishments have been to date.

One way to solve this problem is through the use of instructional record books. Student curriculum maps may be inserted in these books so that the progress of each student can be recorded and used as a basis for individualized assignments.

Using this recording procedure, the teacher needs to make only a single entry for each objective that has been attained. This is an important point. For it is only as record keeping is made fast and simple that it will become feasible for teachers to tackle in a genuine way the job of individualizing instruction for all students.

Ideally, this gain in relatively precise information concerning the progress of each student should be passed on to parents in the form of improved reporting during parent-teacher conferences throughout the year.

We should emphasize that in our individualized programs we have been after something more than basic academic achievement - important as this is. It is our contention that over the years, schools have

not really done a very satisfactory job of preparing students to become life-long learners.

You have heard the familiar refrain. At commencement exercises, we tell the students: "Remember, this is not an end, but only a beginning." And then we say, in effect: "Okay, everybody. You're on your own. Goodbye, and good luck!"

And then the ones that can, and will, go on to some further kind of schooling. And forty percent of the college-bound fail or drop out of that institution during their freshman year. And the ones that don't go on for any more schooling - well, they get along as best they can. And a growing number of these wind up enemployed: a far cry, certainly, from the ideal of responsible, competent, life-long learning.

Now what we are saying is that the schools are partly responsible for this situation. We assert that schools traditionally spend so much time supervising students that the natural curiosity of a young learner gradually becomes a dependent sort of thing, often leaning almost entirely on a steady stream of directions and exhortations from the teachers. Once this sad condition has been achieved, of course, a school can quite correctly claim that only a few of its students

can be depended on to engage in independent inquiry.

We have felt that an important measure of the success of our individualized programs would be the extent to which students in the programs developed the ability to undertake and complete a variety of independent learning activities.

There <u>are</u> some important changes that we are now attempting to bring about in our programs.

For one thing, we are making every effort to improve the quality of our contracts - the means by which lessons are assigned to students.

Generally speaking, our student contracts or lesson assignments have been quite pedestrian...

...and we have not done enough toward making it possible for students to suggest some of their own assignments. We are currently trying to shape a growing number of student opportunities in this direction.

Another area in which we have done little or nothing is the field of educational <u>simulation</u>. I am referring here to direct student involvement in problem-solving situations that are structured as <u>games</u>.

In constructed settings modeled after real-life situations, students have an opportunity to try out different strategies over a period of time in order to observe the consequences of their decisions. This approach to learning appears to be particularly promising in the field of social studies.

The little booklet, Games for Learning, is one that might be read with profit in this connection.

Closely associated with this kind of improvement in our instructional program is the matter of process versus product. What I mean here is that formal schooling has traditionally concerned itself almost exclusively with the results of scholarly inquiry rather than with the nature of the inquiry itself.

A stimulating pamphlet, The New English - A Forward Look, by Postman and Weingartner, puts the matter this way: "It is an odd anti-intellectualism that says to a student, 'You do not need to know how knowledge is generated - what skills, attitudes, methods are needed in order to produce learning. You only need memorize what others have already discovered through their inquiries. If you can learn to restate an arbitrarily determined portion of what they have said, you have done enough.'

"Such a philosophy produces a most insidious kind of waste of human potential, because the intellectual sterility it engenders is obscured behind grades on tests and percentages of students who pass or fail. Investigations of 'retention of learning' of what is taught in this anachronistic manner show again and again that within a short time such 'learning' quickly disappears.

"Every teacher who conducts classes in this way has had the experience of loudly articulated student dismay at the prospect of being questioned during the second marking period about 'knowledge acquired' during the first marking period. Such an attempt is regarded as grossly unjust, since all of the students (and most of the teachers) feel it unreasonable to expect anyone to recall anything 'learned' in this way beyond the last quiz.

"Moreover, 'fact obsolescence' is one of the most vivid signs of our times. What are students to do with a random collection of obsolete facts? How do students learn to evaluate what they know? What have they been taught that will enable them to ask the questions that need to be asked?"

It is, say Postman and Weingartner, important to encourage students "to participate in the discovery of knowledge. Never mind that this knowledge has possibly been discovered and described by someone else. The knowledge that students discover in this manner is theirs and has a unique durability because it is theirs.

"Note too that what may even be more important than any particular product accruing from this process is the fact that the students learn to engage in the process of producing knowledge. This learning transcends the value of all other kinds of learning because it is nothing less than learning how to learn."

We may well end this presentation with a quotation from the book, Independent Study. This quotation summarizes the educational task before us. "Independent study is a theme with infinite variations. And all are aimed at making the school experiences of every learner more profitable and enduring.

"There is much to be done to make the goal of quality education a reality for each individual student. But this is a period of change, of progress in American education. The call to increase the use of independent study is clear and undeniable in its potential advantage for all the children of all the people."

SAMPLE STUDENT ASSIGNMENTS

LA 70-41

Criterion Performance

Given three simple directions in sequence by the teacher, the student is able to follow these directions in the order given.

Sample Test Item

1. Please get the book from the shelf.
2. Bring the book to me.
3. Then sit down with the group.

Instructional Procedures

a. Teacher-led presentation
b. Kit A Language (Ginn) pp. 13, 15, 106, 117, 182
c. Worksheet LA #6

LA 74-7

Criterion Performance

Given a reading selection, with a question or statement that requires a conclusion based on the selection, and a list of several possible conclusions, the student is able to identify the correct conclusion. (85% accuracy)

Sample Test Item

The boys took along several flashlights and a coil of string as they started their exploration. One boy uncoiled the string as the other boy showed their way through the tunnel. Shortly before they ran out of string, they came to a large room with a pool of clear cool water. They knew they had made an amazing discovery.

Why were the boys so amazed?

1. They had tunneled through a hay stack.
2. They had followed a canyon to a lake.
3. A cave was discovered by the boys.
4. They had discovered a secret underground path.

Instructional Procedures

a. Teacher-led presentation
b. High Roads Workbook: pp. 21, 26, 45, 56, 80, 96
c. McCall Crabbs: Book_____ Units 1-10

SCI 70-6

Criterion Performance

Given cubes and spheres of various sizes and textures, the student is able to construct sets of objects on the basis of color, shape, length, volume, and texture.

Sample Test Item

(A set of varied cubes and spheres)

1. Make a set of all smooth, red cubes.
2. Find a small, green, rough cube.
3. Describe this object in two or more ways.
   (A rough, red, sphere)

Instructional Procedures

a. Teacher-led presentation
b. Tape (Sci #2) with small beads

SCI 72-1

Criterion Performance

Given a meter stick and two distances to be measured, the student is able to compare distances first by walking a designated number of steps and then measuring the same distance with the meter stick.

Sample Test Item

1. Compare the length and width of the room by measuring it in steps and with a meter stick. (It is 25 steps wide and 50 steps long, it is 10 sticks wide and 20 sticks long)

2. What can you tell us from these measurements? (The room is longer than it is wide.)

Instructional Procedures

a. Teacher-led presentation
b. Film "Let's Measure: Inches, Feet, Yards" #490
c. Filmstrip "How Long Is It? (Measuring)" N.

SS 74-3

Criterion Performance

Given twenty slides showing important points of interest in Duluth, a random list of their names, and a list of reasons why each is important, the student is able to put the number of each slide in front of the correct name for each and the letter of the reason why each is important after the name of that point of interes

Sample Test Item

Look at each slide carefully. Place the number of the slide in front of the name for each point of interest. When you have finished the slides put the correct lette of the reason why each point of interest is important after the number of each point of interest.

_____Statue of Sieur Duluth
_____Duluth Arena Auditorium

1. New sports center completed in August, 1966
2. The first explorer to leave record that he was at the present location of our city

Instructional Procedure

a. Teacher-led presentation
b. Programmed book and tape #74-3 "Points of Interest in Duluth"
c. Work sheet #74-3C

SS 74-10

Criterion Performance

Given a lettered list of the names of the countries of the British Isles (England, Scotland, Wales, Ireland) and a series of twenty statements describing living conditions in these areas, the student is able to place the letter or letters of the countries in front of the statements which apply. (80% accuracy)

Sample Test Item

Place the letter or letters of the countries in front of the statement which apply to that country.

A. England
B. Scotland
C. Ireland

_____ A large part of this country has a very low population.
_____ This country has many heavy industries.

Instructional Procedures

a. Teacher-led presentation
b. Work sheet #74-10B
c. Listen to tape #74-10 "Living Conditions in the British Isles " and complete the study sheet

MATH 72-7

Criterion Performance

Given a set of three numerals that name whole numbers not greater than six, the student is able to list the four related addition and subtraction equations suggested by the numbers.

Sample Test Item

List the four related addition and subtraction equations suggested by the numerals.

(2, 3, 1)

Instructional Procedures

a. The student will attend a teacher-led-presentation based on pp. 1-4, 47-48 in Mathematics for the Elementary School, Book 2, (Teacher's Commentary), Revised Edition, SMSG, and compute the answers to all exercises on pp. 21-22 in the Student's Text.

b. The student will attend a teacher-led-presentation based on pp. 33, 45, 56 in Elementary Mathematics, Patterns and Structure, Book 2, (Teacher's Edition), and compute the answers to all exercises on pp. 33, 45, 56 in the Student's Text.

MATH 74-1

Criterion Performance

Given a finite set, the student is able to list the number of the set.

Sample Test Item

List the number of the set.

n (1, 4, 6, 5, 7) = _____

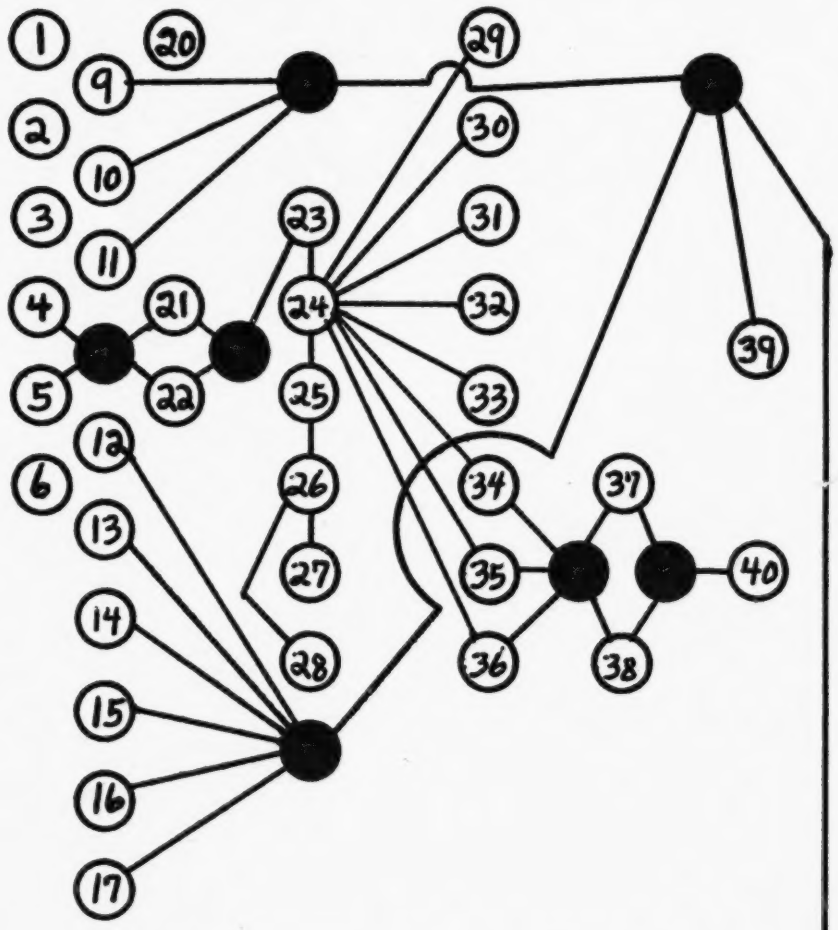
Instructional Procedures

a. The student will study and work through the development sections and compute the answers to all exercises on pp. 4-8 in Mathematics for the Elementary School, Book 4, Part I. Revised Edition, SMSG.

b. The student will study and work through the developmental sections and compute the answers to all exercises on pp. _____ in Elementary Mathematics - Patterns and Structure, Book _____ Nichols and others.

c. The student will study and work through the developmental sections and compute the answers to all exercises on pp. _____ in Elementary School Mathematics, Book _____, Eicholz and others.

d. T. L. P.



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Curriculum Map
Language Arts
Series 71
Franklin-Nettleton Project
School Year 1966-67